INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 99/00836

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl[6]: B01D 1/00, B04C 9/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B01D 1/00, B04C 9/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
W.PAT. BO1D 1/00 + SWIRL OR VORTEX ORCYCLON: or hydrocyclon:
B04C 9/00 and EVAPORAT:

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4668441 A (26 May 1987) Hess	1-28
X	GB 2268418 A (12 January 1994) Howard	1-28
X	EP 873773 A (22 April 1998) Nishi	1-28

[X] Further documents are listed in the continuation of Box C

[ ] See patent family annex

* Special categories of cited documents:

"A" Document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
19 October 1999

Date of mailing of the international search report
25 OCT 1999

Name and mailing address of the ISA/AU

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INTERNATIONAL SEARCH REPORT

International application No.
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Derwent Abstract Accession No 88-196735/28 Class P41 SU 1360807 (GOPO POLY) 23 December 1987	1-28
X	EP 747102 A (11 December 1996) Kenton	1-28

P. ENT COOPERATION TREA

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 17 May 2000 (17.05.00)	
International application No. PCT/AU99/00836	**Applicant's or agent's file reference** FP11537
International filing date (day/month/year) 30 September 1999 (30.09.99)	**Priority date** (day/month/year) 30 September 1998 (30.09.98)

Applicant

CLARKE, Neville et al

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

17 April 2000 (17.04.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland** Facsimile No.: (41-22) 740.14.35	Authorized officer Claudio Borton Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference FP11537	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).	
International Application No. **PCT/AU99/00836**	International Filing Date *(day/month/year)* 30 September 1999	Priority Date *(day/month/year)* 30 September 1998
International Patent Classification (IPC) or national classification and IPC **Int. Cl.** [7] B01D1/00;B04C9/00		
Applicant ALCOS TECHNOLOGIES PTY LTD et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 2 sheet(s).

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of the report
17 April 2000	30 January 2001
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer **G.Carter** Telephone No. (02) 6283

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/AU99/00836

I. Basis of the report

1. With regard to the **elements** of the international application:*

☐ the international application as originally filed.

☒ the description, pages 1-24- , as originally filed,
pages , filed with the demand,
pages , received on with the letter of

☒ the claims, pages **26-29** , as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages **25-25a** , received on with the letter of 08January 2001

☒ the drawings, pages 1-4 , as originally filed,
pages , filed with the demand,
pages , received on with the letter of

☐ the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , received on with the letter of

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, was on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/fig.

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report*

INTERNATIONAL PRELIM[redacted]Y EXAMINATION REPORT

[redacted]ernational application No.
PCT/AU99/00836

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims1-28	**YES**
	Claims	**NO**
Inventive step (IS)	Claims1-28	**YES**
	Claims	**NO**
Industrial applicability (IA)	Claims1-28	**YES**
	Claims	**NO**

2. Citations and explanations (Rule 70.7)

None of the citations raised in the International Search disclose a cyclonic evaporator in which the components are subjected to partial flash vaporisation on being discharged from the hydrocyclone section into the evaporator section which partially separates them into at least two streams.

1. A cyclonic evaporator for separating two or more components of a feed material prior to or simultaneously with at least partially vaporising one of the components, said cyclonic evaporator including a first portion in the form of a hydrocyclone and a second portion in the form of an evaporator, said hydrocyclone having at least one inlet located at or towards one side of the hydrocyclone for admitting feed material containing the at least two components to the hydrocyclone in a direction substantially tangential to the centre line of the apparatus; a means for imparting a swirling motion to the feed material about the centre line of the apparatus to at least partially separate the at least two components of the feed material from each other, and an outlet located at or towards one end of the hydrocyclone in a substantially axial direction to the side wall of the hydrocyclone for discharging the at least two components from the hydrocyclone in a swirling motion axially in a direction substantially parallel to the centre line of the apparatus wherein at least one of the components of the feed material is subjected to at least partial flash vaporisation on being discharged from the outlet to further assist in separating the two components from each other so that the components are discharged from the hydrocyclone into the evaporator at least partially separated into at least two streams

2. A method of separating one component from another component of a feed material, including admitting the feed material containing the two components to a hydrocyclone forming one part of the apparatus to impart a swirling motion to the feed material for at least partially separating the components from each other and to enhance the vaporisation of one of the components, vaporising at

least part of the one component, separating the one component from the other component by the one component having a tendency to remain as a vapour in the apparatus whereas the other component has a tendency or propensity to be condensable to a liquid in the apparatus, and discharging the one and the other components from the apparatus in at least partially separated streams whereby separation of the two components is substantially maintained, wherein one of the components of the feed material undergoes at least partial flash vaporisation on emerging from the hydrocyclone.

3. An apparatus or method of any preceding claim in which the feed material is an aqueous waste material or an organic solvent based waste material.